

Uncertainty: measuring, modeling, conveying

THINGS WE
WANT
ANSWERS TO

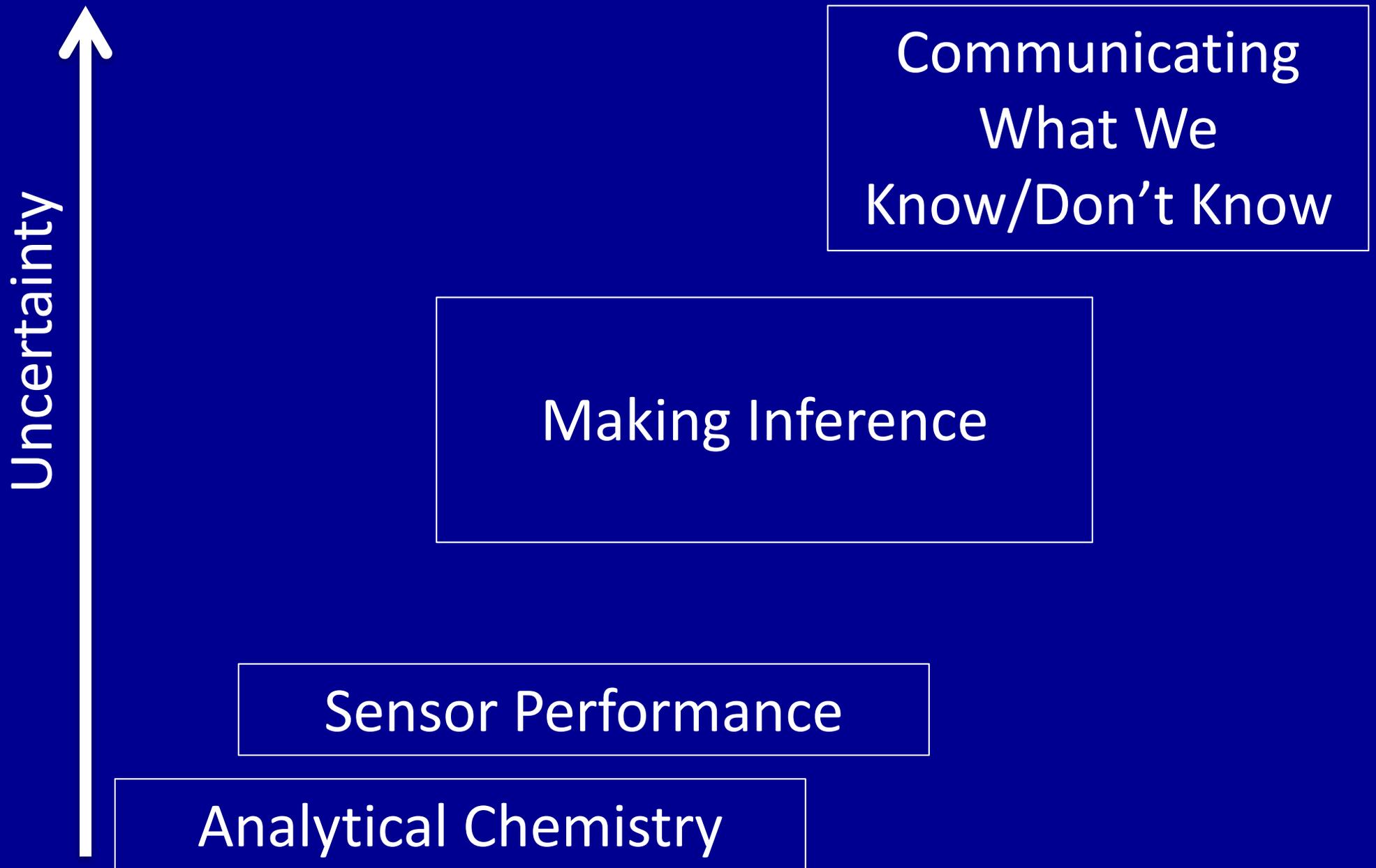


THINGS WE
CAN GET
ANSWERS TO

Francis Chan



The Challenge: Uncertainty-Rich Landscape



The Challenge: Uncertainty-Rich Landscape

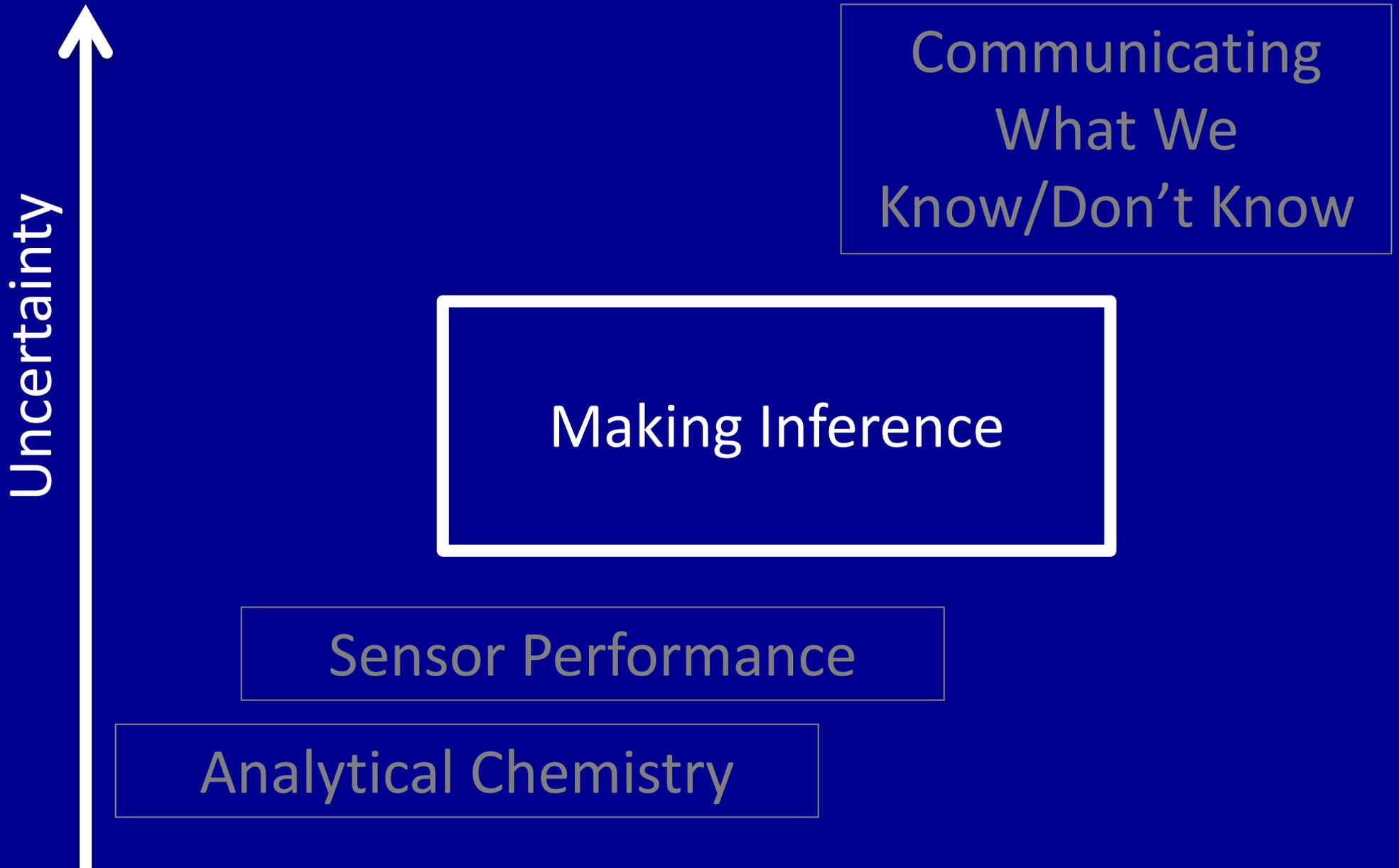
Uncertainty ↑



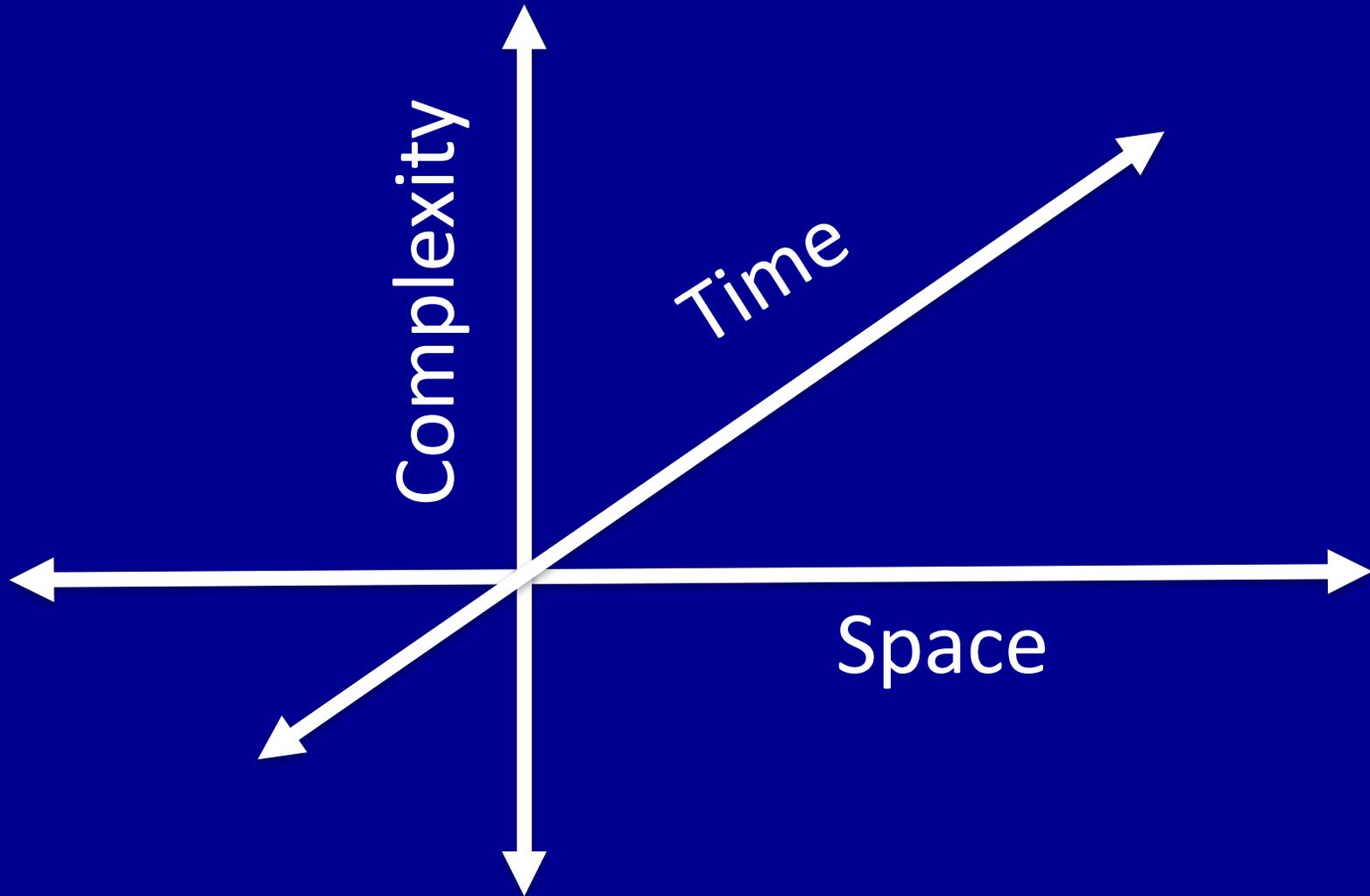
Sensor Performance

Analytical Chemistry

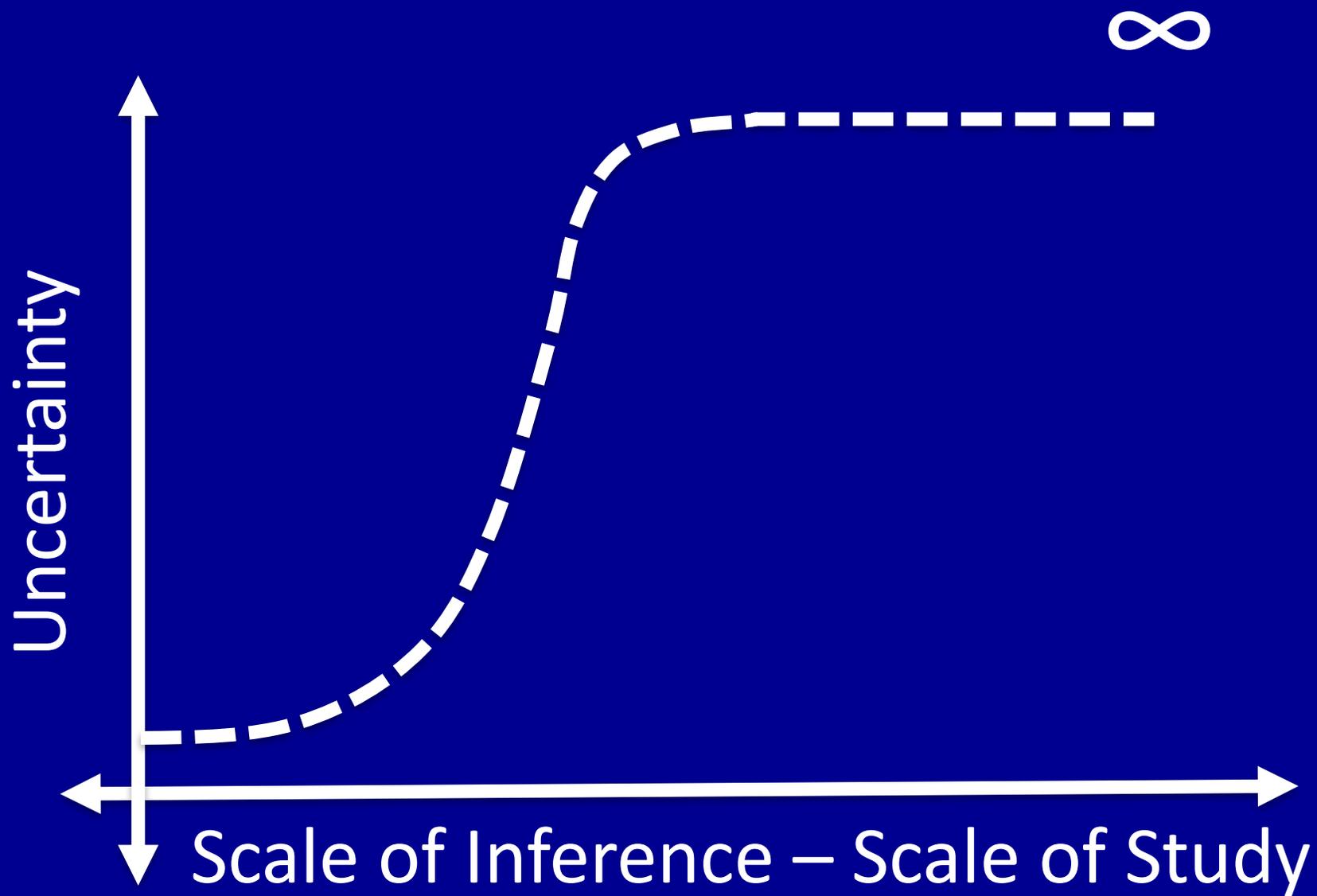
The Challenge: Uncertainty-Rich Landscape



Making Inferences: Challenges of Extrapolating Across Scales



Making Inferences: Challenges of Extrapolating Across Scales



Challenges of Spatial Inference:



Photo: K. Nielsen

Latitude

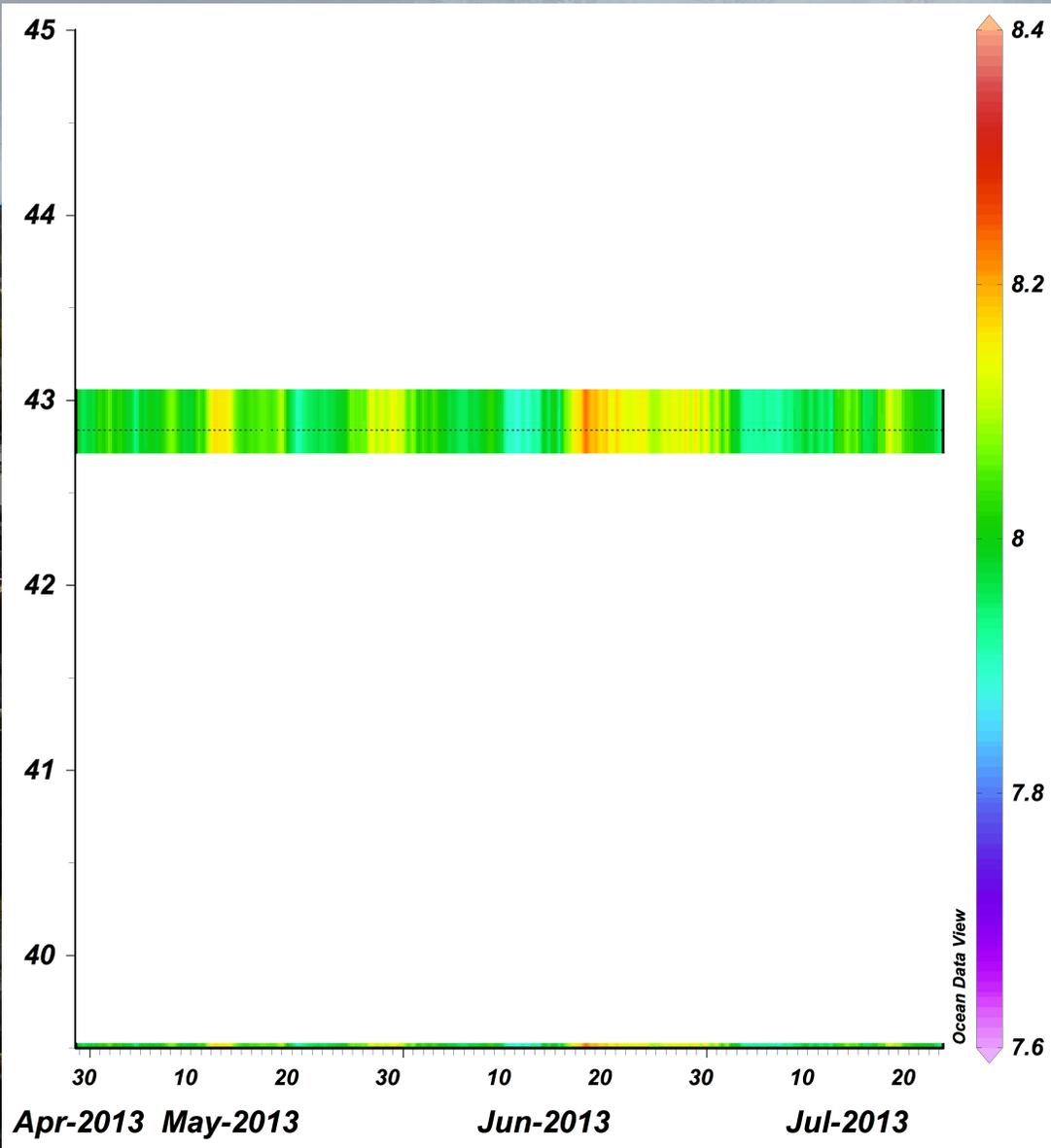
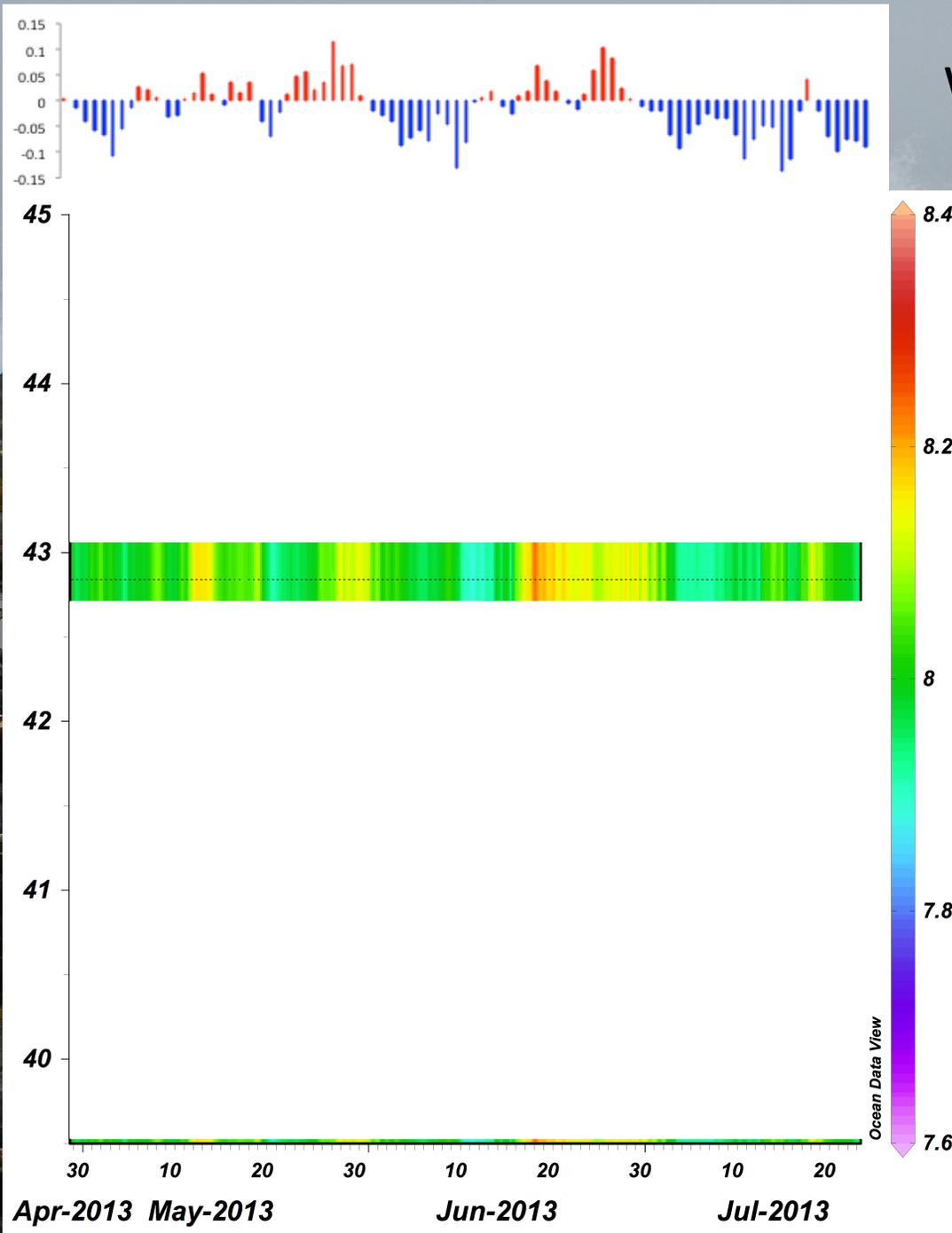


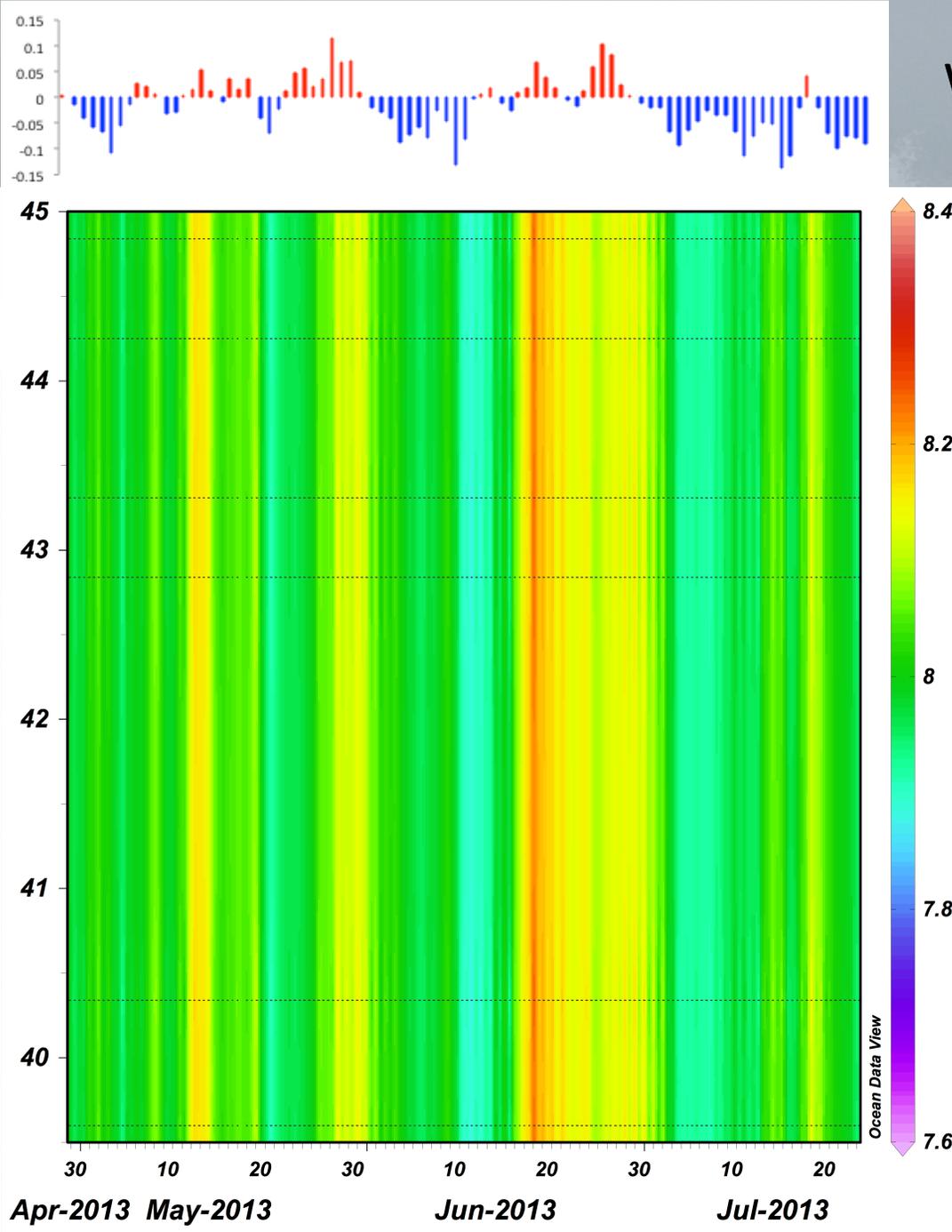
Photo: K. Nielsen

Windstress @ 44.65N



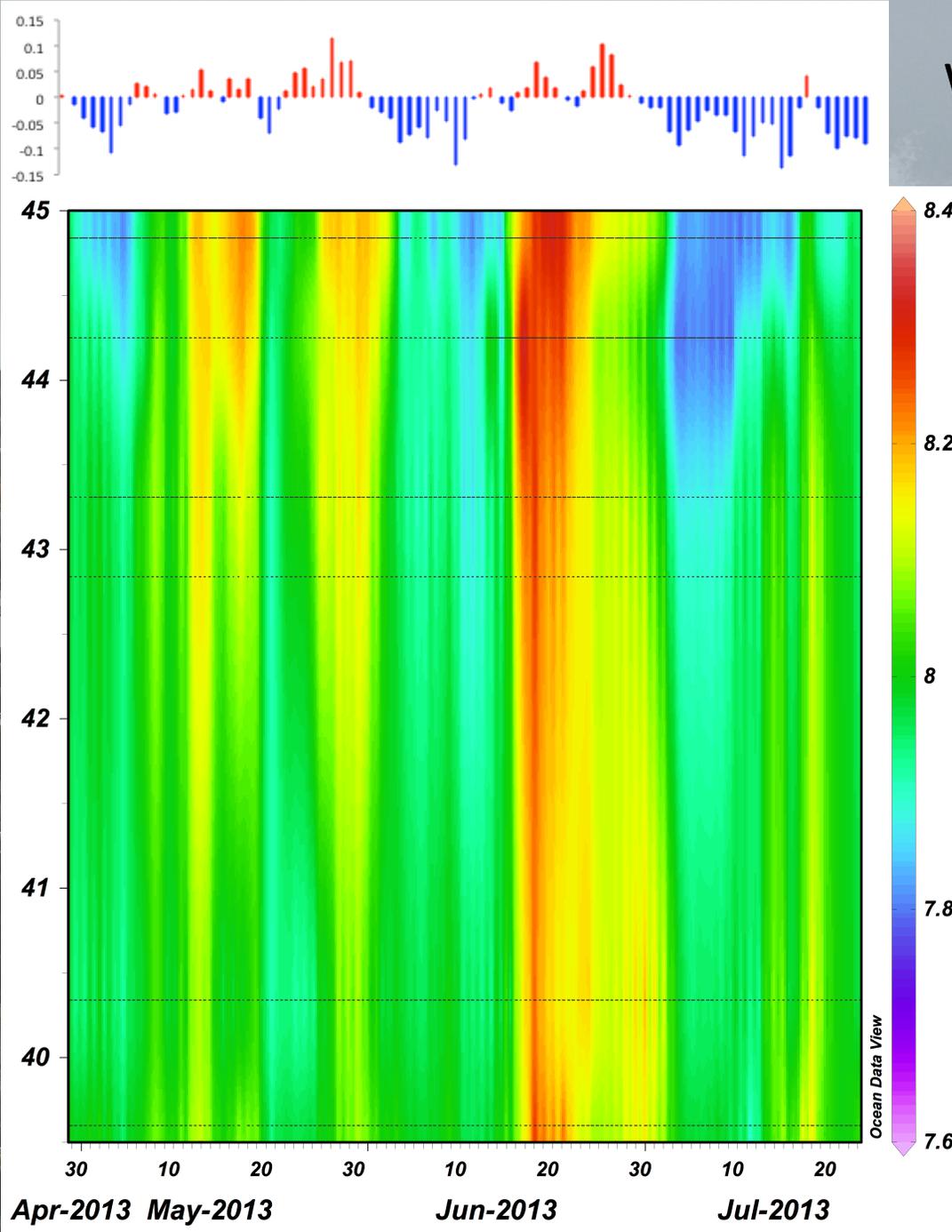
Latitude

Windstress @ 44.65N



Latitude

Windstress @ 44.65N



Latitude

Challenges of Complexity and Time:

- *Scaling from genes to ecosystems?*
- *Into a no analog state future*



A Communication-Uncertainty Trade-Off?

Clarity/Effectiveness of
Message to Society



Uncertainty

A Communication-Uncertainty Trade-Off?

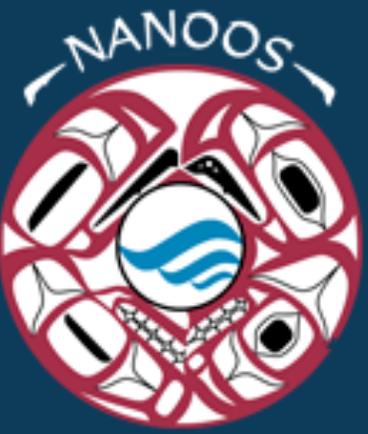
Options for Society

time

Uncertainty



What strategies can we adopt to address these challenges?



Sharing Data and Interpretation

CeNCOOS
Central & Northern California Ocean Observing System

C-CAN
California Current Acidification Network

SCCOOS SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

SCRIPPS INSTITUTE OF OCEANOGRAPHY

OceanTimeSeries

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UCSD

Preliminary Data: OR and N. CA | OMEGAS

omegas.science.oregonstate.edu/?q=prelim_data_OR-NCA



OMEGAS
Ocean Margin Ecosystems Group for Acidification Studies

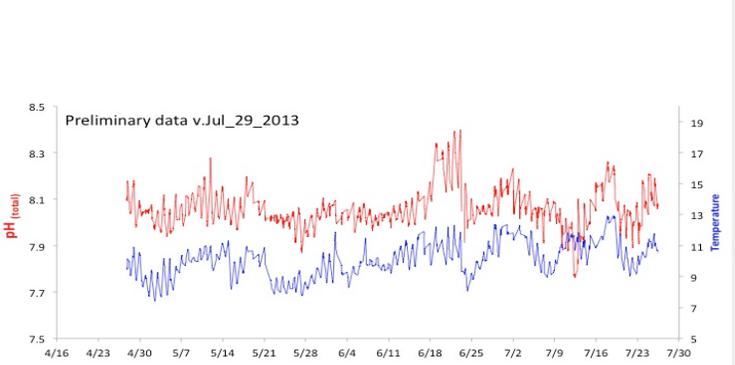
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Preliminary Data: OR and N. CA

Posted July 31, 2013. These are preliminary data processed by Oregon State University PISCO-OMEGAS scientists. Do not cite as final data. For complete list of all OMEGAS sites, visit our [site inventory](#) page.

April 25 - July 25
Version July 29, 2013
Cape Mendocino (OR), 40.34 deg N
Intertidal (surf-zone) sensors
This station is maintained collaboratively with Drs. Sally Hacker and Karina Nielsen.

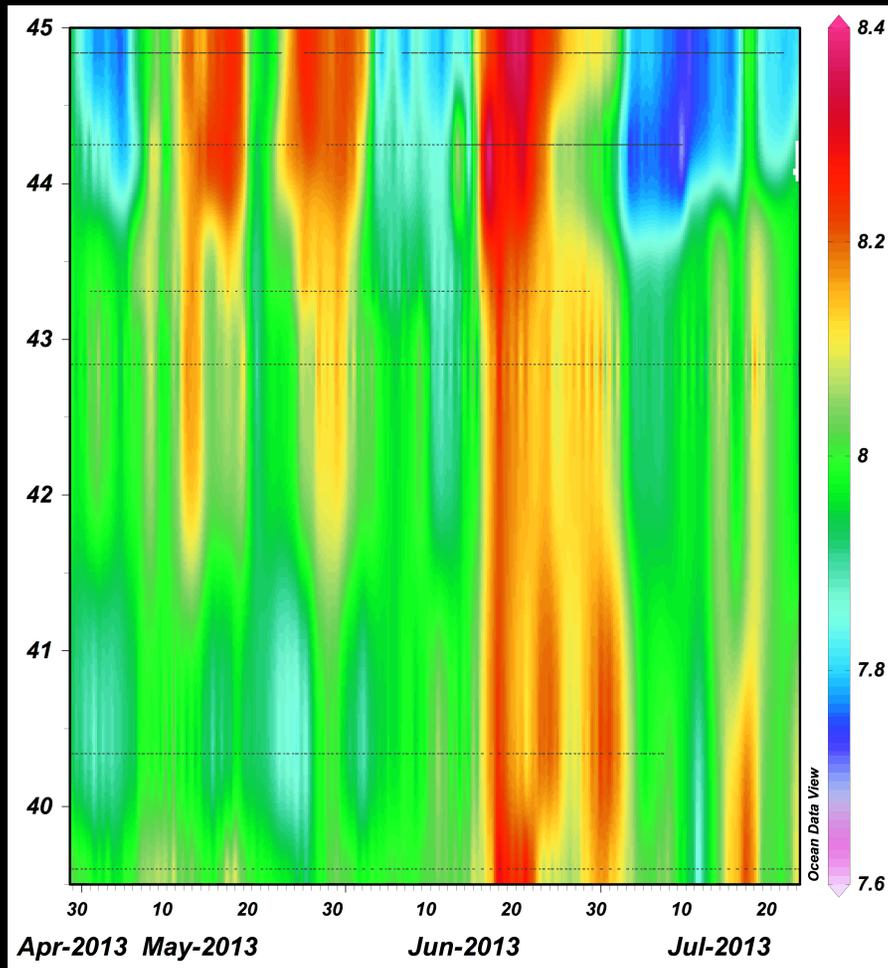


Preliminary data v.Jul_29_2013

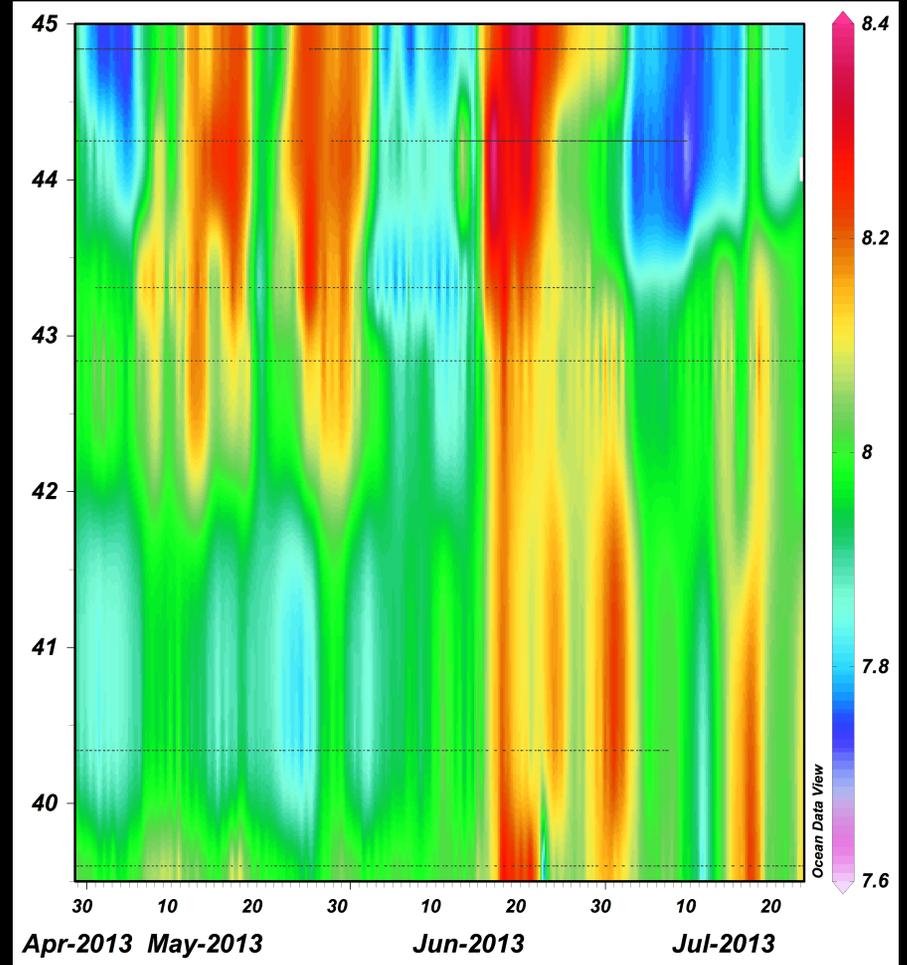
Surf-Zone pH Cape Mendocino Intertidal Site (40.34°N)



Uncertainty is Relative

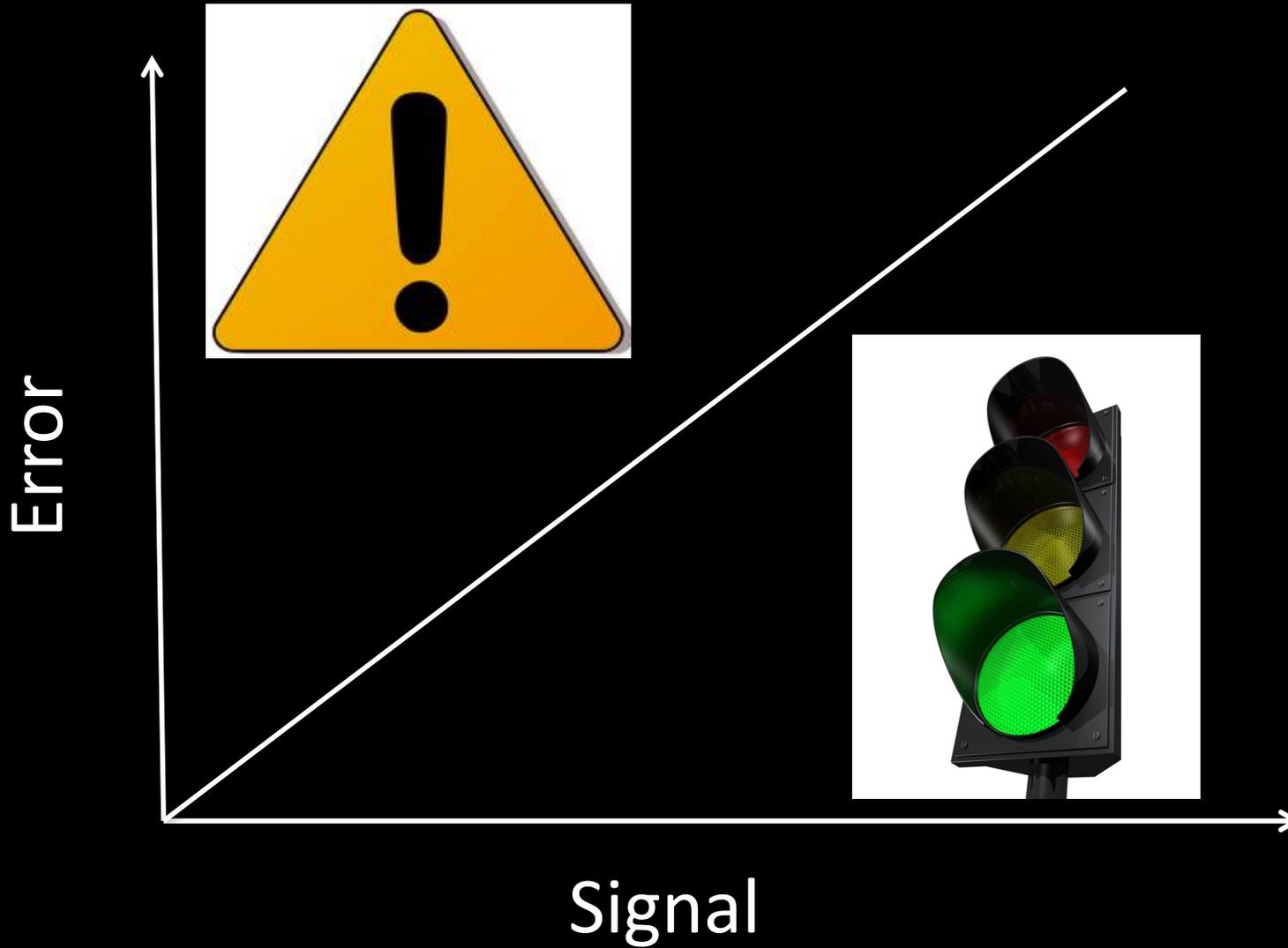


Drift corrected



Drift uncorrected

Uncertainty is Relative

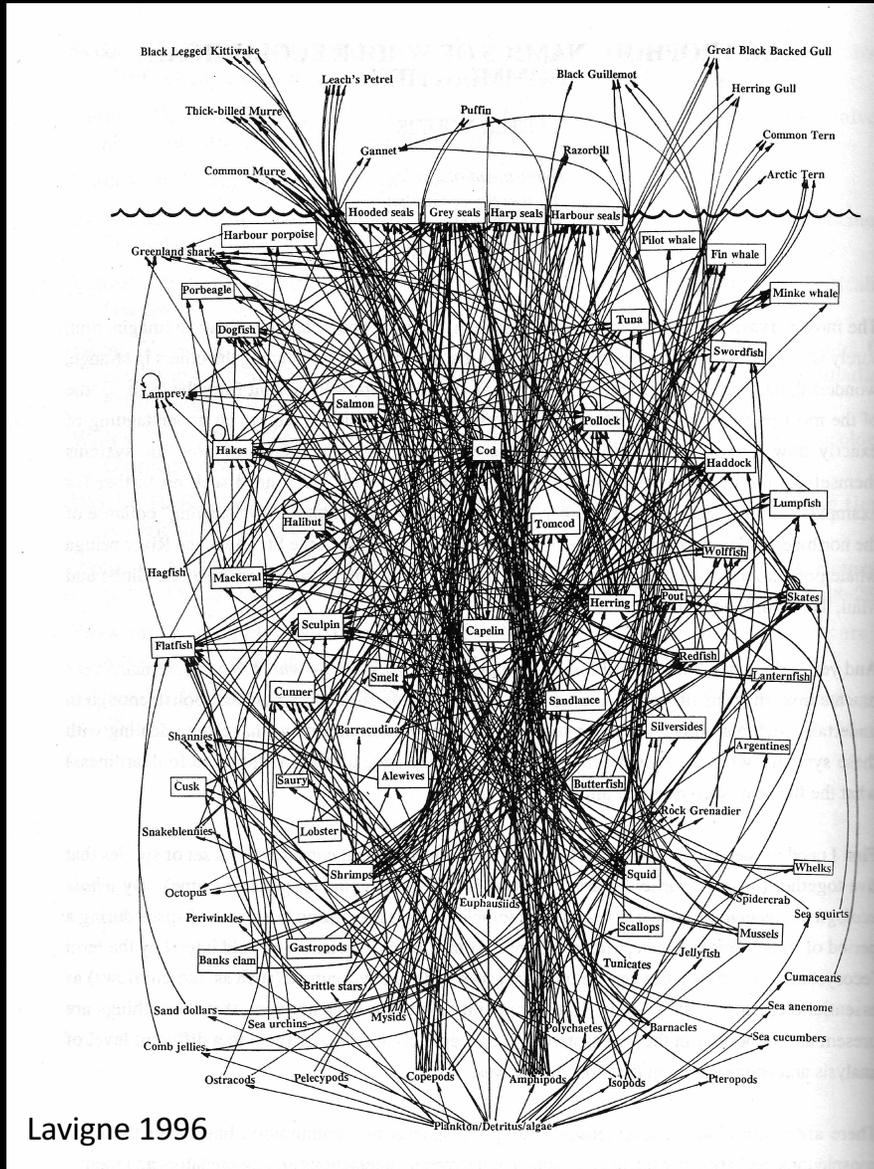


Chasm of Uncertainty?

or

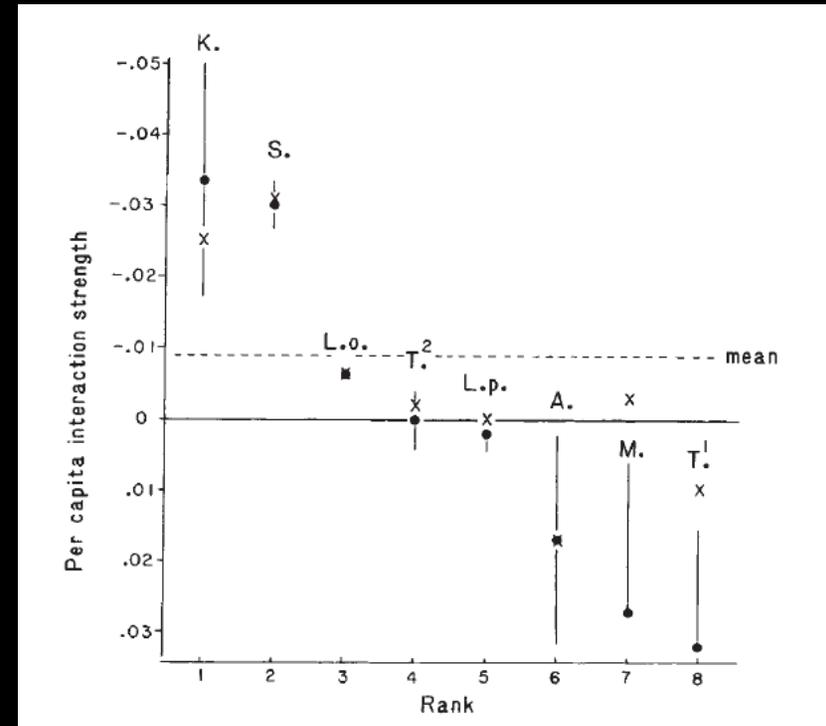
Manageable Complexity?

“simplified” Northwest Atlantic food-web



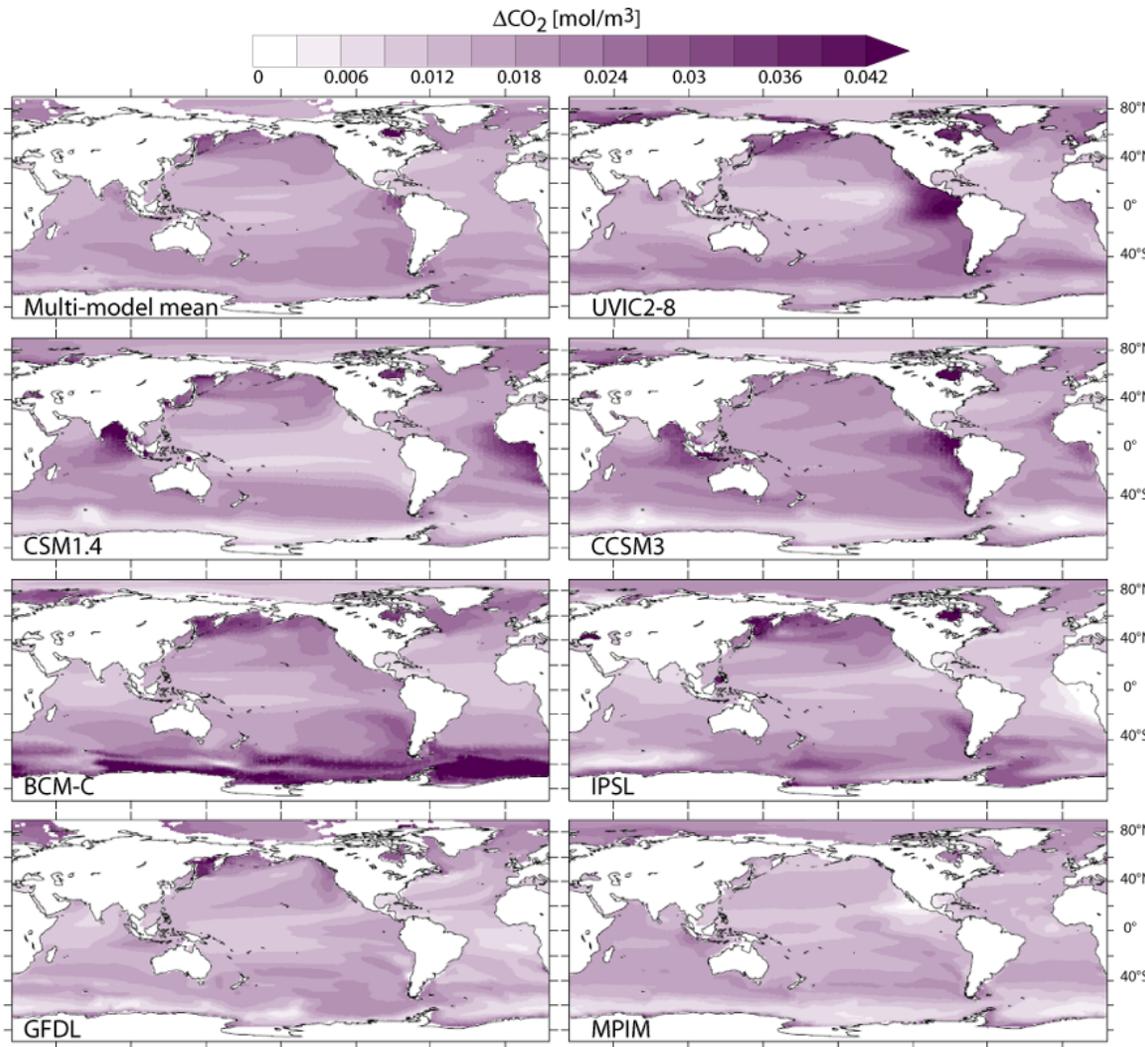
Not all interactions might matter

Per capita interaction strength

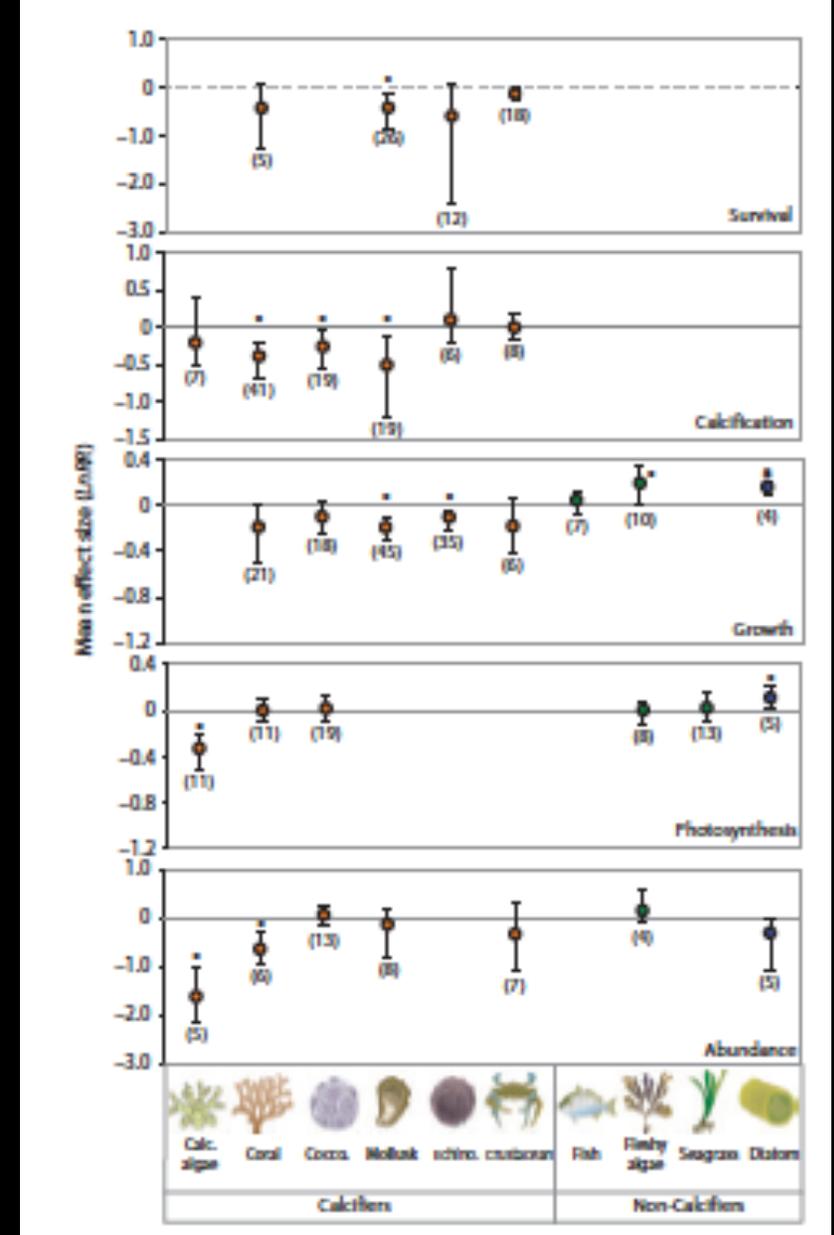


Paine 1992 Nature

Standardized Experiments and Meta-analyses

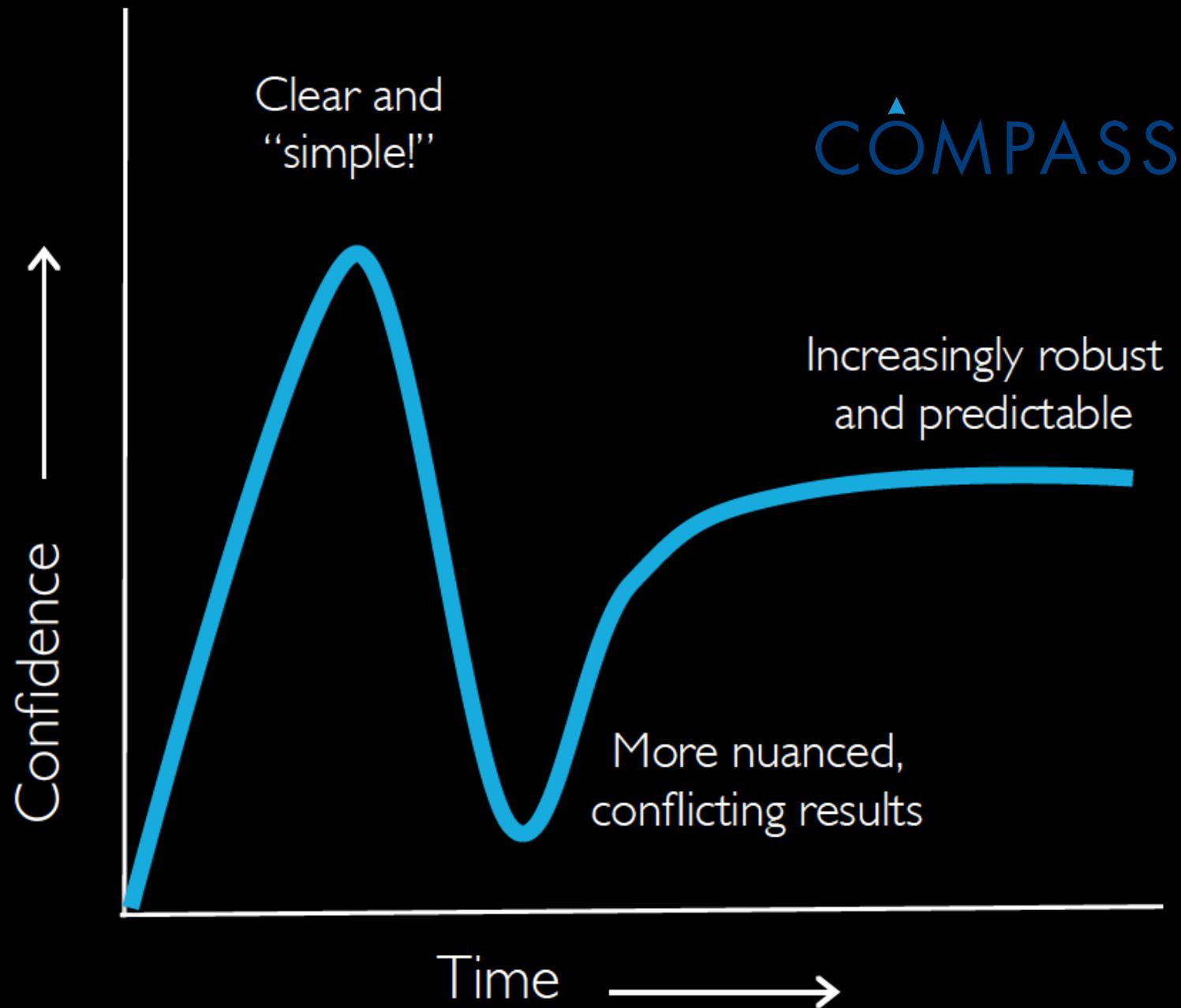


Cocco et al. 2013 Biogeosciences

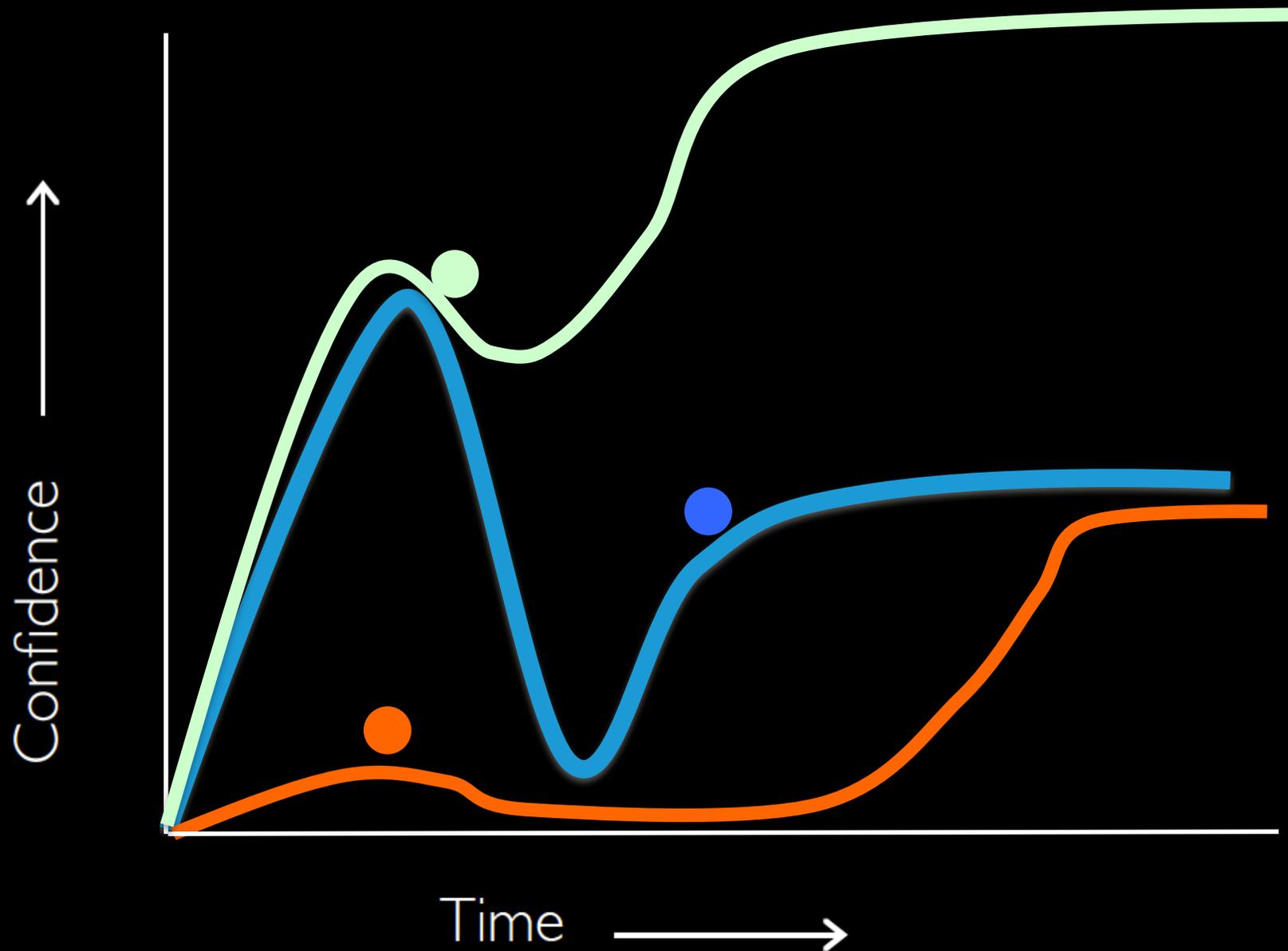


Kroeker et al. 2013 Global Change Biology

Multidisciplinary Race to Understanding?



Multidisciplinary Race to a Bottleneck?



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